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Forest Research Notes

Northeastern Forest Experiment Station

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SEVEN YEARS LATER: EFFECTS OF WILDFIRE IN A YOUNG STAND OF VIRGINIA PINE AND HARDWOODS

In November 1952 a hot surface fire burned through part of a 30-year-old Virginia pine-hardwood stand near Beltsville, Md. Observations were made for the next 2 years to evaluate the effects of this type of fire under these stand conditions. The main direct effects during the 2 years, as reported by Church in 1955[1], were: 45 percent mortality of trees 1 inch d.b.h. and larger, principally in the smaller size classes; and destruction of any pine seedlings that may have been present. An indirect effect, on the credit side, was the establishment of almost 11,000 pine seedlings per acre on the burn. During these 2 years, only 250 pine seedlings per acre became established in an unburned portion of the same stand.

Because of the strong surge of pine reproduction that came in on the burn, it seemed worth while to check developments in the stand after some further lapse of time. So, 7 years after the fire and 5 years after Church's last tallies, we relocated and remeasured the four original plots. Three of the plots were in the burned area and one was just outside in part of the same original stand.

Effects on Original Stand

Superficially, there were no signs of a fire having occurred 7 years ago. But the measurements showed that the fire had caused rather significant continuing changes in the

[1]Church, Thomas W., Jr. Observations following wildfire in a young stand of Virginia pine and hardwoods. U. S. Forest Serv. Northeast. Forest Expt. Sta. Forest Res. Note 49, 2 pp., 1955.

Table 1.--Changes in basal area and numbers of living trees on burned and unburned areas before and after a wildfire in a Virginia pine-hardwood stand[1]

Stand condition	Basal area				Living trees			
	1952	1953	1954	1959	1952	1953	1954	1959
	Square feet per acre				Number per acre			
Burned	112.5	103.5	96.4	92.1	1,220	830	754	754
Unburned	127.1	125.4	--	170.2	1,180	1,100	1,020	860

[1]Stems 0.6 inches and larger in d.b.h.

stand, as compared to areas outside the fire perimeter. Table 1 expresses these changes in terms of basal area and numbers of trees. There was a net loss of 20.4 square feet per acre in basal area on the burned plots during the 7-year period, although by 1959 the decline in numbers of living trees seemed to have ceased. This leveling-off was due in part to the ingrowth of hardwood sprouts. In striking contrast, there was a net gain of 43.1 square feet in basal area on the unburned area, even though the number of trees there has continued to decline.

Although the number of trees 1 inch d.b.h. and larger has decreased in both stand conditions, the net decrease has been considerably greater on the burn. Much of the decrease has been in the smaller classes of pine.

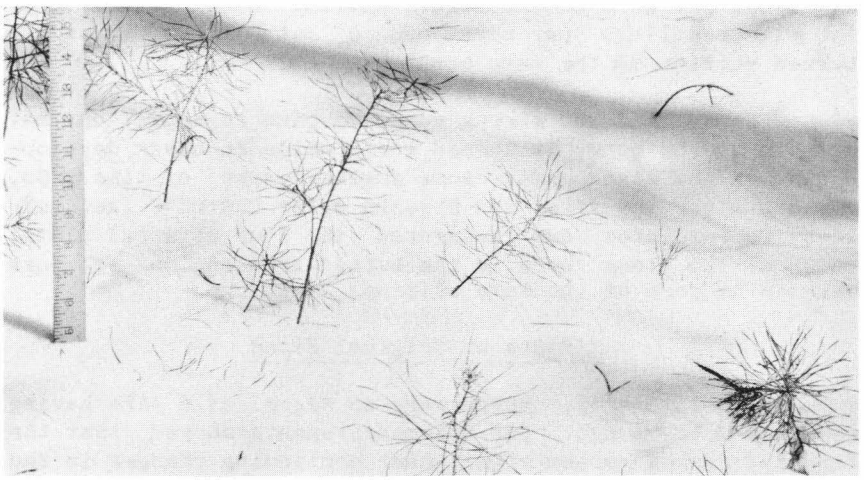

Figure 1.--*Stocking and survival of Virginia pine seedlings on the burn has been good, but the sparse foliage and general appearance indicate lack of vigorous growth because of continuing suppression.*

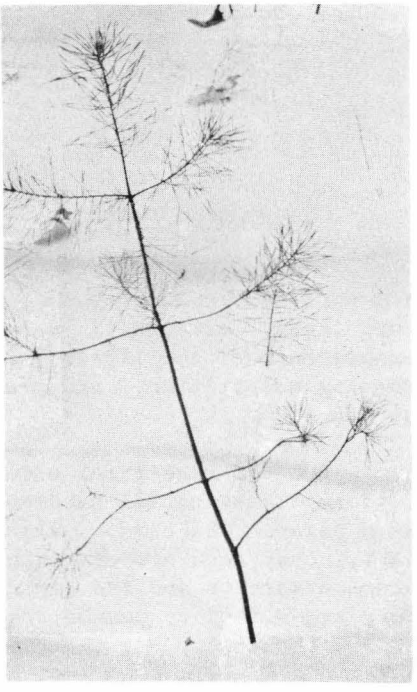

Figure 2.--*This Virginia pine seedling--7 years old but scarcely 2 feet tall--is one of the larger seedlings on the burned area. The very limited growth can be attributed to continuing suppression, which has resulted in only one terminal growth period each year, rather than the usual two or three.*

Effects on Pine Regeneration

Church advanced two principal reasons for the heavy restocking of Virginia pine seedlings on the burned plots: reduction in litter depth, particularly of the hardwood component; and decrease in shade by the killing of numerous small trees and some larger ones.

These may well have been the main reasons responsible for the large influx of seedlings after this burn. But, to quote Church: "Ultimate survival will depend upon competition from both the remaining overstory and the prolific hardwood sprouts." So far, the competition has not adversely affected the number of pine seedlings: there were 17,000 per acre present on the burn in 1959, as compared to some 11,000 in 1954.

Unfortunately, good stocking and survival are not necessarily correlated with vigorous growth. Most of the seedlings on the burn lack vigor, as indicated by their sparse foliage and meager height growth (fig. 1). And although some of the seedlings have probably been living at least since 1954, the largest are scarcely 2 feet tall and lack promising growth potential (fig. 2). Even if the overstory were now removed, it is unlikely that the suppressed seedlings would regain vigorous growth and good form.

And what of the 250 seedlings per acre that were starting on the unburned plot in 1954? By 1959 they had

disappeared, presumably because of suppression. The present large basal area of 170 square feet means bigger trees, a denser canopy, and less light getting through to the forest floor than in 1954.

In Recapitulation

These observations emphasize a frequently noted characteristic of Virginia pine--that the seedlings need full sunlight for good growth. Wildfires in Virginia pine or pine-hardwood stands usually kill back the smaller understory trees, often kill many overstory trees as well, and consume much of the litter, thereby opening the stands, decreasing competition, and providing seedbeds on which pines can start.

But the beneficial effects for pine are only temporary if any substantial hardwood overstory or understory existed before the fire. Although many pine seedlings may start, they soon are overtopped and suppressed by resurging hardwood sprouts and the expanding crowns of surviving overstory trees. They cannot be expected to establish a pine stand without properly timed weeding and release treatments.

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